

not affect of Na⁺ dependent α -methyl-D-glucose uptake. In all cases the affects were dose dependent.

Similar experiments were carried out with MEPE fusion-protein purified by calmodulin affinity chromatography. Surprisingly, recombinant MEPE did not inhibit Na⁺ dependent phosphate co-transport, but increased phosphate uptake in a dose dependent manner (see figure 24). A doubling of phosphate uptake was observed at 1000 ng/ml ($p < 0.001$). These experiments confirm that MEPE fusion protein specifically increases Na⁺ dependent phosphate co-transport in a human renal cell line CL8.

While the present invention has been described with reference to the specific embodiments it should be understood by those skilled in the art that various changes may be made and equivalents may be substituted without departing from the true scope and spirit of the invention. In addition, many modifications may be made to adapt to a particular situation, material, composition of matter, process step or steps, to the objective, spirit or scope of the present invention. All such modifications are intended to be within the scope of the claims appended hereto.

The entire disclosure of each document cited (including patents, patent applications, journal articles, abstracts, laboratory manuals, books, or other disclosures) in the Background of the Invention, Detailed Description, and Examples is hereby incorporated herein by reference. Moreover, the sequence listing is herein incorporated by reference.

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Claims

1. An isolated or substantially pure form of a polypeptide having phosphatoin activity and an approximate molecular weight of 60 kDa as measured on SDS-PAGE.
2. The polypeptide of claim 1, which has an approximate molecular weight of 200 kDa as measured on bis- tris SDS-PAGE at pH 7.
3. The polypeptide of claim 1 or 2, which is glycosylated and/or phosphorylated.
4. The polypeptide of any one of claims 1 to 3, which is obtainable following purification from Saos-2 cells (Deposit No. ECACC 89050205).
5. The polypeptide of any one of claims 1 to 4 or an immunologically and/or biologically active fragment thereof, which comprises an amino acid sequence encodable by a polynucleotide selected from the group consisting of
 - (a) polynucleotides encoding at least the mature form of the polypeptide comprising the amino acid sequence depicted in SEQ ID NO: 2 (Figure 8);
 - (b) polynucleotides comprising the coding sequence as depicted in SEQ ID NO: 1 (Figure 8) encoding at least the mature form of the polypeptide;
 - (c) polynucleotides encoding a polypeptide derived from the polypeptide encoded by a polynucleotide of (a) or (b) by way of substitution, deletion and/or addition of one or several amino acids of the amino acid sequence encoded by the polynucleotide of (a) or (b);
 - (d) polynucleotides comprising the complementary strand which hybridizes with a polynucleotide of any one of (a) to (c);
 - (e) polynucleotides encoding a polypeptide the sequence of which has an identity of 60% or more to the amino acid sequence of the polypeptide encoded by a polynucleotide of any one of (a) to (d);

- (f) polynucleotides encoding a polypeptide capable of regulating phosphate metabolism comprising a fragment or an epitope-bearing portion of a polypeptide encoded by a polynucleotide of any one of (a) to (e);
- (g) polynucleotides encoding an epitope-bearing portion of a phosphatonin polypeptide comprising amino acid residues from about 1 to 40, 141 to 180 and/or 401 to 429 in SEQ ID NO: 2 (Figure 8);
- (h) polynucleotides comprising at least 15 nucleotides of a polynucleotide of any one of (a) to (g) and encoding a polypeptide capable of regulating phosphate metabolism;
- (i) polynucleotides encoding a polypeptide capable of regulating phosphate metabolism comprising the cell and/or glycosaminoglycan attachment motif and/or the bone mineral motif of a polypeptide encoded by a polynucleotide of any one of (a) to (h); and
- (j) polynucleotides the nucleotide sequence of which is degenerate as a result of the genetic code to a nucleotide sequence of a polynucleotide of any of (a) to (i).
6. The polypeptide of any one of claims 1 to 5, which is capable of regulating phosphate metabolism.
7. An isolated polynucleotide encoding a polypeptide of any one of claims 1 to 6.
8. The polynucleotide of claim 7, which comprises RNA or DNA.
9. The polynucleotide of claim 7 or 8, wherein the nucleotide sequence comprises sequential nucleotide deletions from either the C-terminus or the N-terminus.
10. A polynucleotide which hybridizes with the polynucleotide of any one of claims 7 to 9 and which encodes a mutated version of the polypeptide of any one of claims 1 to 6 which has lost at least part of its phosphatonin activity.
11. A vector containing the polynucleotide of any one of claims 7 to 10.